SmartWay Transport Partnership
Strategies & Technologies Glossary

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I. Idle Control Strategies

a) Direct Fired Heater (DFH)

Direct fired heaters, or bunk heaters, are devices that can reduce idling by providing in-cabin heat for drivers in cold temperatures. Some product models offer an engine heating option that will also keep the engine warm overnight. Most DFH's operate by using fuel directly from the main tractor fuel tank. These devices can generally provide 10 to 20 hours of heat on a single gallon of diesel fuel, depending on the settings and options. Typical costs for this device range from $900 to $3000. For a partial list of manufacturers and device specifications, please visit the SmartWay website at http://www.epa.gov/otaq/smartway/idlingtechnologies.htm.

b) Auxiliary Power Unit (APU)

APU's provide a larger array of comfort features for drivers looking to reduce idling. APU's can provide heat, air conditioning, power for household electrical devices and engine heat. Most devices combine a small heater, a compressor for air conditioning and an alternator. APU's may be powered by diesel fuel directly from the tractor fuel tank, or by a bank of rechargeable batteries. Diesel driven APU's can operate for 5 hours or more on a single gallon of diesel fuel. Costs for these devices can range from $3500 to $9000, but are typically in the $6000 to $7000 range. For a partial list of manufacturers and device specifications, please visit the SmartWay website at http://www.epa.gov/otaq/smartway/idlingtechnologies.htm.

c) Truck Stop Electrification

Truck plazas equipped with truck stop electrification systems allow drivers to draw electrical power and in many cases, heating, cooling, telecommunication, and Internet hookups from a ground source. Different systems may or may not require the purchase of an adaptor to connect to the tractor.

d) Driver Tag Teams

Driver tag teams are known by many different names in the industry, such as slip seating, or drop and swap. This strategy involves one driver going from point A to point B, where a second driver then takes it from point B to point C. Because of the driver switch, overnight idling is not necessary.

e) Double Drivers

Having two drivers in the cab instead of one allows for the continual movement of freight, thereby eliminating the need for overnight stops and idling. Once the first driver reaches their maximum allowed driving time, the second driver commences driving while the first driver rests in the sleeper berth. This type of operation is best suited for expedited or perishable freight moving over long distances.

f) Engine Shutdown

Engine shutdown is the automatic or voluntary shutoff of the tractor engine after a certain amount of time. Engine shutdown can be as simple as a corporate "shut down" or "no idle" policy or it can be more complex with the use of electronic devices or software encoded onto the engine control chip that automatically shuts the engine down. Engine shutdown works most effectively when combined with a comprehensive driver training program and driver incentive program. For a partial list of automatic shutdown devices, please visit the SmartWay website at http://www.epa.gov/otaq/smartway/idlingtechnologies.htm.

g) Other

Other idle reduction strategies that your company may be using include overnight hotel stays for drivers and the use of the PrePass weigh and/or toll payment service. Please speak with your Partner Account Manager about these and other idle reduction strategies that you may be using.

II. Aerodynamic Devices: Combination & Single Unit Trucks

a) Aero Profile Tractor

These tractors generally have a short, streamlined hood with aerodynamic contouring. The grill may be angled slightly, rather than completely vertical. The exhaust pipe is generally behind the cab rather than along the side. Some examples include the Freightliner Columbia/Century, Kenworth T2000/T600, Peterbilt 386/387, Mack Vision, International ProStar and Volvo VN.

b) Cab-Over-Engine Tractor

As the name suggests, these tractors have the driver sitting over the engine. There is no front hood on these tractors. An example is the Freightliner Argosy.

c) Integrated Cab Roof Fairing

Extends from the front windshield of the truck to the rear of the cab with enclosed sides that line up with the side of the cab. This type of fairing is almost always an original equipment manufacturer (OEM) component. Examples include the Freightliner Columbia/Century, Kenworth T2000, Peterbilt 387, Mack Vision and Volvo VN. Other examples may exist.

d) Cab Roof Fairing

A roof fairing that extends partially over the cab of the truck with enclosed sides. It may not line up perfectly with the sides of the cab. This type of fairing can be an original equipment manufacturer (OEM) optional component or it may be an after-market add-on.

e) Cab Roof Deflector

A straight piece of plastic or fiberglass that extends from the top of the cab at an angle. It usually has open sides and may be retractable.

f) Nose Cone

Rounded deflectors attached to the front of a straight truck or box van that extends slightly over the cab of the truck. These devices may also be known as aerodynamic bubbles.

g) Cab Side Fairing

Extends downward from the base of the cab between the wheels of the tractor, covering the open space and streamlining the fuel tank(s). Most cab side fairings have steps to reach the cab molded directly into the fairing.

h) Cab Air Dam Front Bumper

A rounded bumper that improves airflow within the engine compartment as well as under-cab airflow. It is usually plastic and the same color as the cab rather than the vertical chrome bumpers on more traditional tractors.

i) Cab Aerodynamic Mirrors

Mirrors with rounded casings on the front that eliminate flat surfaces. They are usually black or colored plastic rather than the flat backed, chrome mirrors on more traditional tractors.

j) Trailer Gap Reduction

Achieved by adding either a cab extender and/or a trailer gap reducer. Tractor cab extenders are vertical additions to the rear sides of the tractor that fan out slightly and reduce the space between the tractor and trailer. Trailer gap reducers are usually rounded additions to the sides and possibly top of the front of the trailer that also reduce the gap between the tractor and trailer.

k) Trailer Side Skirts

Trailer side skirts, or trailer fairings, extend down from the bottom of the trailer to cover part of the open space between the tractor and the rear wheels.

l) Flatbed Trailer Tarps

Trailer tarps properly drawn over irregularly shaped loads can improve airflow and decrease wind resistance, thereby improving fuel economy.

m) Trailer Tail

An addition to the rear of the trailer that is used to reduce aerodynamic drag. There are several different types, but a standard tail is usually an addition to the rear sides and possibly top of the trailer that fan in slightly towards the back door(s). A boat tail fairing is a large rounded addition to the rear of the trailer that covers the entire back side.

III. Tire Technology

a) Single Wide Tires

Single wide-base tires can improve truck fuel economy by reducing rolling resistance and tractor tare weight (empty weight). They also enable a lower center of gravity for tank trailers, thereby improving stability and safety. Wide-base tires can be retread. Preliminary testing shows fuel economy improvements in the range of 2 to 5%.

b) Automatic Tire Inflation

This device automatically monitors tire pressure and provides pressurized air when needed, on a continuous basis. Maintaining proper tire pressure reduces rolling resistance thereby increasing fuel economy. Additional benefits include reduced tire wear, reduced chance of tire failure and decreased time spent on tire pressure inspections. Depending on the technology being used, pressurized air may be supplied from a hub-mounted compressor driven by wheel rotation or directly from a central air supply driven by the truck's air brake compressor.

c) Other

Low profile, low rolling resistance tires have been shown to increase truck fuel economy. Please speak with your Partner Account Manager about the fuel efficiency improvements you have seen in your fleet.

IV. Weight Reduction

Weight reduction refers to components that reduce the tare weight of the tractor. This is done by using lighter weight materials, such as aluminum. Common components that can be substituted include wheels, axle hubs, fuel tanks and the cab frame. Downsizing to a smaller engine can also provide significant weight savings.

V. Advanced Lubricant Technology (Synthetic Lubricants)

a) Low Friction Engine & Drive Train Lubricants

Commonly known as synthetic engine oil and synthetic transmission & drive train lubricants, these synthetic products can improve fuel efficiency by as much as 3% by reducing friction between parts. Synthetic lubricants are designed to withstand the extreme pressures of the engine, transmission and drive train better than traditional oils. In addition to increased fuel efficiency, synthetic engine lubricants reduce wear and increase maintenance intervals.

VI. Engine & Truck Upgrades

a) Direct Drive Transmission

Direct drive transmissions have a different gearing ratio than traditional manual transmissions. They generally have higher gear ratios which provide a quicker and more powerful start, but less efficiency in higher gears. This type of transmission shows the most promise in stop-and-go applications; it may not be ideal for line haul operations or trucks that travel at highway speeds for extended periods of time.

b) Single vs. Double Axle

Single axle trailers weigh less and correspondingly have less tire rolling resistance due to fewer tires in contact with the road. Where weight limits and equipment availability allow, companies should try to match the number of axles to the load and weight requirements.

VII. Larger Capacity Trailer Strategies

The use of larger capacity trailers eliminates the need to send multiple tractors to the same destination. By combining loads into larger trailers, companies free up tractors and drivers for other revenue generating loads. For smaller amounts of freight traveling to multiple destinations on the same route, double and triple trailers may be an effective method of moving a larger amount of freight with a single tractor and driver.

VIII. Speed Management Policy

Reduced highway speeds can dramatically improve fuel efficiency. A long haul truck that reduces its speed from 70 miles per hour to 65 miles per hour can improve fuel efficiency by approximately 5%. Reduced highway speed also reduces engine and brake wear, which cuts down on the frequency and cost of maintenance stops. Speed management policies can be implemented with little to no cost. The most effective speed management programs combine electronic engine controls with driver training and incentives.

IX. Intermodal Shipping

Intermodal freight transport combines the flexibility of truck transport with the efficiency of rail transport. Over long distances, intermodal can cut overall fuel use by 65% as compared to truck-only moves. Intermodal services are offered by the five major railways in the US as well as by Canadian and Mexican railway operators. Intermodal services may offer a variety of transport methods including trailer-on-flat-car (TOFC), container-on-flat-car (COFC) and intermodal-specific trailer chassis.

X. Diesel-Electric Hybrid

Diesel-electric hybrid power train vehicles have two power sources; the diesel engine and an electric motor with a battery pack. The diesel engine is the main source of power with the electric motor providing a power boost when needed (acceleration, climbing hills, etc.). When braking, the electric motor will capture energy that would otherwise be lost and recharge the battery pack. Hybrid vehicles show the most promise in stop-and-go applications such as pickup and delivery and parcel delivery operations.

XI. Reflashing

Reflashing involves reconfiguring the engine control chip with new software that recalibrates the tractor engine. This recalibration is meant to lower nitrogen oxide (NOx) emissions by slightly modifying the combustion parameters within the engine. This strategy applies to certain engines built by seven different engine manufacturers (Caterpillar, Cummins, Detroit Diesel, Mack, Renault, Navistar/International & Volvo) between the years of 1993 and 1998. Please note that as of March 2004, the California Air Resources Board (CARB) has mandated the reflashing of medium and heavy duty diesel vehicles in the state of California, on a phase-in schedule, at no extra cost to the vehicle owner. For more information, please refer to the CARB rule at http://www.arb.ca.gov/regact/chip04/chip04.htm.

XII. Miscellaneous

a) Driver Training

Formal driver training programs are now a major part of most transportation organizations. For the most part, this training is undertaken to improve safety and reduce the need for asset maintenance but, fuel economy improvements from driver training can also be substantial. Effective programs can improve fuel economy by 5% or more, with some fleets reporting gains of up to 20%. Some common techniques drivers can learn include progressive shifting, engine speed optimization, smooth acceleration & braking, anticipatory driving, efficient route choice, speed control and idle reduction. Please speak with your Partner Account Manager about the fuel efficiency improvements you have seen from your driver training program.

b) Operations Packages

Technology and software packages such as Qualcomm, Xata and others can be used to improve operational performance and fuel efficiency. Some common uses of these packages include route selection, asset tracking and reduction of empty miles traveled.

Please speak with your Partner Account Manager about any operations packages you may be using.

c) Driver Fuel Incentive Plan, No Idle Policy, etc.

Driver fuel incentive plans and no idling policies are cost effective methods of encouraging drivers to improve their fuel economy. This strategy works most effectively when combined with a comprehensive driver training program. Benefits for drivers may include cash bonuses, more vacation or use of a better tractor. Please speak with your Partner Account Manager about your driver incentive program and fuel efficiency improvements you have seen in your fleet.

d) Other

Please speak to your Partner Account Manager regarding other technologies or strategies that you may be able to include in your FLEET Model.

XIII. PM & NOx Reduction Technologies

a) Diesel Oxidation Catalyst (DOC)

A diesel oxidation catalyst (DOC) is a device added to the exhaust system of a tractor that reduces the amount of particulate matter (PM) emitted. The device is generally a large honeycomb structure with an active catalyst made up of a layer of precious metal. Emission reductions are approximately 20% for PM, 40% for hydrocarbons and 50% for carbon monoxide. DOC's have a negligible impact on tractor fuel efficiency. Costs are dependent upon the size of the engine and are usually between $1000 and $2000 per unit, making them an ideal retrofit device.

b) Diesel Particulate Filter (DPF)

A diesel particulate filter (DPF) is similar to a diesel oxidation catalyst and is one of the two major technologies being employed to meet the 2007 emissions regulations. A DPF is considered a "flow-through' device whereby the exhaust is forced through a honeycomb shaped, ceramic filter that is blocked at one end. Because of this design, it is important to monitor the exhaust back pressure and ensure the DPF is cleaned properly so that the filter does not become blocked. Most filters are designed to clean themselves (referred to as passive regeneration) but this requires an elevated engine temperature to burn off the trapped PM. For vehicles that don't meet the minimum temperature requirements, the filter will trigger what's referred to as an 'active regeneration event'. This means that some diesel fuel will be allowed to pass through the engine un-combusted and will be burnt over the catalyst, allowing the PM within the filter to be burned away. One major difference between the DOC and DPF is that the DPF requires the use of ultra low sulfur diesel (ULSD) fuel with sulfur content at or below 15 parts per million. Emission reductions are approximately 50 - 90% for PM, 90% for hydrocarbons and 90% for carbon monoxide. Please do NOT include this technology in the "PM & NOx Reduction Technologies" section; the model will assign credit for this lower emission technology automatically.

c) Cooled Exhaust Gas Recirculation (CEGR)

Cooled exhaust gas recirculation (CEGR) is the second major technology being employed by all but one engine manufacturer to meet the 2007 engine regulations; Caterpillar is using its own ACERT technology. CEGR works by returning a portion of the exhaust gas exiting the engine back into the intake manifold, generally through a variable geometry turbocharger. Prior to reaching the intake manifold, the exhaust gas is sent through a heat exchanger to reduce the temperature of the gas. When this exhaust is introduced into the combustion chamber, it lowers the amount of oxygen available for combustion, which in turn lowers the peak combustion temperature. This decrease in combustion temperature leads to a decrease in NOx formation. Emission reductions are approximately 50% for NOx. Please do NOT include this technology in the "PM & NOx Reduction Technologies" section; the model will assign credit for this lower emission technology automatically.